THE
OPTICAL
MAGIC
LANTERN
JOURNAL
AND
PHOTOGRAPHIC
ENLARGER
EDITED BY J. HAY TAYLOR
A MAGAZINE OF POPULAR SCIENCE FOR THE LECTURE-ROOM AND THE DOMESTIC CIRCLE
Entered at Stationers' Hall
1889

WITH WHICH IS INCORPORATED THE "LANTERN WORLD."

Vol. 12.—No. 141. FEBRUARY, 1901. *Price* **2d.**, *Post-free* **3d.**

CONTENTS.

	PAGE
Notes	13
Vapour Light for Lantern Illumination	15
The Use of the Electric Light in the Optical Lantern	16
How a Lantern Entertainment was received in Halifax, N.S.	18
Interesting Items	19
Shadowgram or Silhouette Slides.—No. XXII.	20
The Optics of Trichromatic Photography	23
Patent Intelligence	24
Notes and Queries	24

NOTICES.

THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price Two Pence, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

12 months, 3/-. United States, 75 cents.

EXCHANGE Column, General Wants, &c. (not Trade)—First 20 words, 6d.; and for every 3 additional words, 1d.

SMALL ADVERTISEMENTS must reach the office not later than the first post on the 24th of each month. All cheques and postal orders to be made payable to the Magic Lantern Journal Company, Limited.

EDITORIAL communications must be addressed, **J. HAY TAYLOR.** Advertisements and business communications to **THE MAGIC LANTERN JOURNAL COMPANY, Limited, 9, Carthusian Street, London, E.C.**

American Agents:—The International News Co., 83 and 85, Duane Street, New York City.

NOTES.

The Birmingham Exhibition.—The annual exhibition in connection with the Birmingham Photographic Society will be held from February 23rd to March 2nd. Full particulars may be obtained from the hon. sec., Mr. H. Vooght-Cornish, Athletic Institute, John Bright Street, Birmingham.

◆ ◆ ◆

Infringements of Trade Mark.—Action was recently taken in Vienna by Kodak, Ltd., against a firm using the trade mark "Nodark," as applied to photographic cameras. The defendant was condemned to pay a penalty of K.500, and to destroy all circulars, documents, and other articles bearing the imitation trade mark. A similar action was taken in Paris against a company using the name "Cosaque" for photographic apparatus. The defendant was condemned to pay F.500 damages, and was forbidden to sell the photographic apparatus called "Cosaque" or "New Cosaque," or to print or publish any circular mentioning the marks in question.

A Hint to Many Photographic Societies.—Several, in fact we may say the majority of photographic societies, possess a lantern and adjuncts for projecting slides, and too often these are in a very dilapitated state, to say nothing of being quite out of date. A member of the Manchester Amateur Photographic Society is at present pressing the subject upon his society. Speaking of the lantern in use, he explains that it is old and done; no doubt it was a first-class apparatus at one time, but that was many years ago. He also explains that the stand is so rickety that the operator has to stand almost motionless to avoid shaking the whole affair. We know several societies which might well take a hint in this matter, as it is expected that they should be somewhat up to date.

◆ ◆ ◆

Illustrated Press Bureau.—The Illustrated Press Bureau, Limited, with offices at 10, Norfolk Street, Strand, has been inaugurated to act as an agent between photographers who have subjects suitable for reproduction in the illustrated press, in book illustration, etc., and the editors and publishers of illustrated matter. Arrangements have been made whereby every print of immediate importance that is received by the morning's post is submitted to every London editor, likely to be interested, before the evening of the same day. The directors are Messrs. Robt. M'Clure, Shumner Sibthorp, and H. Snowden Ward.

◆ ◆ ◆

'Twas dead and is alive again.—The Leytonstone Camera Club has been reorganised, and will again meet every Thursday at the Studio, 16, New Fillebrook Road, Leytonstone. The hon. secretary is Mr. C. A. E. Chandler, 49, Leyspring Road, Leytonstone.

◆ ◆ ◆

From Monthly to Quarterly.—The periodical *The Photographer*, which has for many years been issued monthly by Messrs. Geo. Mason & Co., of Glasgow, will in future be issued quarterly, in January, April, July, and October.

◆ ◆ ◆

The Electric Light for the Lantern.—Relative to the interesting article in this issue by Mr. W. H. Golding, an authority on the above subject, we have to thank Messrs. Newton & Co. for their kindness in lending us the two illustrations which are used to explain matters.

Glasgow Exhibition.—The exclusive rights of photographing the coming exhibition at Glasgow have been acquired by Messrs. Annan & Son, of Sauchiehall Street, Glasgow.

◆ ◆ ◆

An Enthusiastic Lanternist.—As everybody in America in the lantern line knows, Mr. Jex Bardwell, of Detroit, Michigan, has long stood at the top of the tree. He is now nearly seventy-eight years of age, yet takes an active part is photographic and lantern matters, and is always ready to assist a lanternist with his great experience. He is a great reader and experimenter, and keeps himself well up to date in all subjects.

◆ ◆ ◆

The Lantern in Kentucky.—A correspondent in Louisville, Kentucky, U.S.A., in the course of a letter to us says:—"The lantern is rather in disrepute here because so large a percentage of entertainments are given by incompetent men—I might say fakirs—with poor apparatus and slides. Personally, I am very much interested in the lantern, but only as an amateur. An English gentleman who is in charge of a coal mine in a neighbouring town, called on me a few days since to know where he could rent a lantern and set of views for one night to give an entertainment to his miners, and he could not be supplied in this city of 225,000 population."

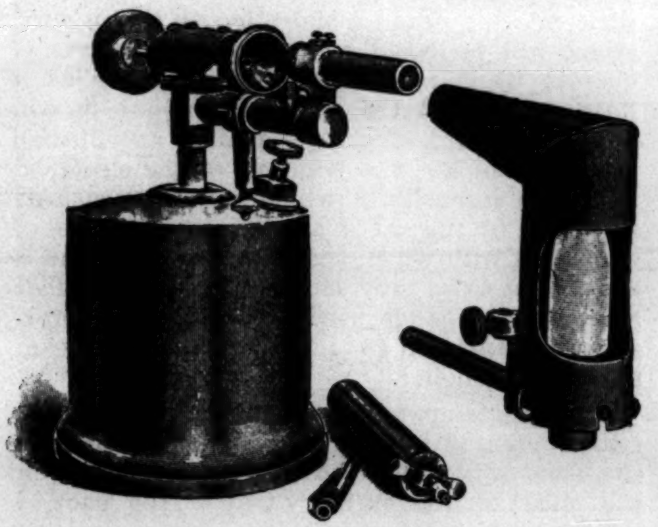
◆ ◆ ◆

Crowds on the Streets on Sunday Evenings.—Relative to a paragraph on this subject in last issue, Mr. G. Davies, of the Abercorn and District Temperance Union, writes:—"During this winter we have given several Sunday evening temperance lantern services, and by this means have been able to get at the crowds which we have hitherto failed to reach; it has also augmented our society financially (admission by collection). I have often noticed that such audiences cannot stand the reading of long tedious stories, however good; but when we have interesting recitations, illustrated with lantern slides, we always get the best of attention. I should very much like to see slide makers pay greater attention to the illustrating of good short recitations, and should much like to hear the experiences of other readers; but of this I am certain, that people can be attracted to a bright lantern service if the right sort of programme is put before them."

Vapour Light for Lantern Illumination.

We are indebted to Mr. W. C. Furnas, of Louisville, U.S.A., for sending us an illustration of this new form of lantern illuminant, which, as far we can learn, has never reached this country. The illustrations, we are informed, are taken from a catalogue of a firm now defunct. A gentleman who used it tells us that "the light was the strongest next to limelight, but it made quite a roaring noise, not enough, perhaps, to be strictly annoying."

In order to let our home readers have an idea as to what has been done in this direction in America we reproduce two of the illustrations, and on looking at them those who are conversant with the action of plumbers' blow lamps used in this country will have no difficulty in understanding the principle. We also give the description of it as sent out by the makers. They explain that :—



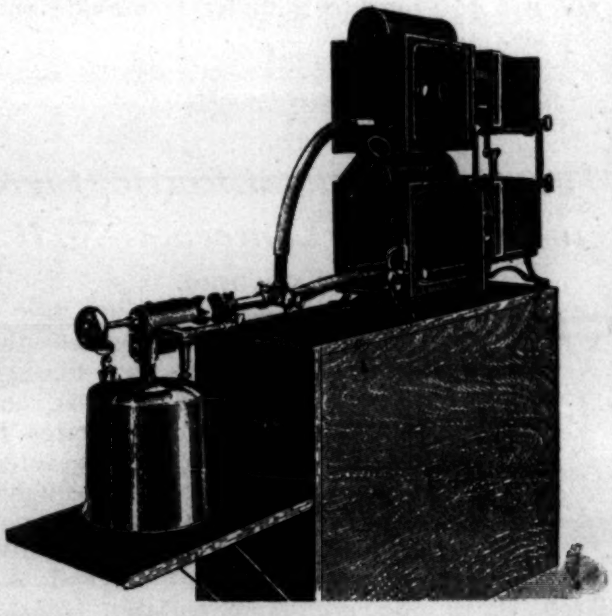
The apparatus is small, light, perfectly safe, clean to handle, emits no disagreeable odour as does the acetylene gas apparatus, is the most economical form of light made, will throw a good clear picture up to 12 feet in diameter and will give good results on larger pictures.

The entire apparatus, including tank, air pump, and burner weighs but about 6 lbs. and can be carried in an ordinary hand satchel or in the case which accompanies the outfit. The height to top of the burner is only 11 inches.

The basic principle of this lighting apparatus is similar to the Welsbach gas burner, but the gasoline vapour furnishes a much purer hydrogen gas than is used for house illumination, and the high pressure adds efficiency and makes the flow of gas perfectly steady; it has a mantle made on an entirely new principle of extra heavy material especially treated with a chemical preparation of recent discovery, and the perfect proportion and accurate arrangement of the parts for the mixing of the air and gas gives the light which it produces a strength about five times as great as any other gas light produced in combination with a mantle.

The arrangement and perfecting of this apparatus and its adaptation for magic lantern and stereopticon illumination is the latest work of a well known scientist and expert in this line.

To operate the apparatus is extremely simple; in fact, is almost as easy to use as an ordinary gasoline stove.



A small quantity of gasoline is placed in the tank, then with the air pump fill the balance of the space in the tank with compressed air in the same way as a bicycle tyre is inflated. The air pressure is necessary to give force for brilliancy and a steady flame.

To the end of the jet on top of the reservoir is attached one end of a rubber tube and the other end is attached to the tube of the burner in the lamp house. On the burner is placed a special made mantle.

Above the tank is what is called an auxiliary heater which when lighted heats the main jet and converts the small stream of gasoline into hydrogen gas, which passes through the rubber tube to the burner and when lighted produces a most intensely brilliant incandescent light over the entire surface of the mantle.

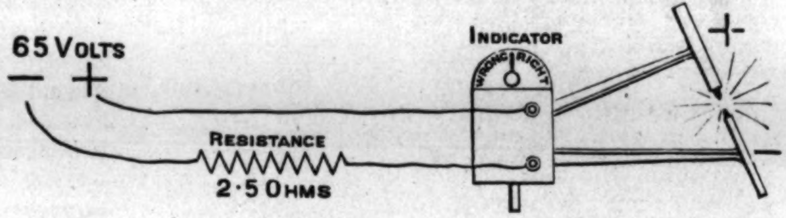
On account of the high pressure and the purity of the gas generated from the gasoline, a light is produced which shows a much greater difference between it and the regular Welsbach style of gas light than between the ordinary gas light and the incandescent electric light. The Giant Incandescent Vapour Light will consume but about one pint of gasoline for an evening's entertainment at a cost of about 2 cents. While the use of this apparatus was intended as a superior means of illuminating stereopticon or magic lantern views, we have found that it will illuminate motion pictures from 6 to 8 feet in diameter and will project a good sharp stereopticon picture up to 15 feet in diameter, and will do even better under favourable conditions.

* * *

The Use of the Electric Light in the Optical Lantern.—No. II.

By W. H. GOLDING.

THE electric force, by which the current is caused to flow through the conductors and between the poles at the point of discharge, is stated by the electrician in volts, and the current employed for lighting is usually supplied to the consumer at an electro-motive force of about 100 volts. This is somewhat beyond the force which the arc lamp suitable for the lanternist's purpose can profitably utilise, and it needs to be reduced by suitable resistances to about 65 volts or perhaps a little less. At this pressure, if it may be so described, the current can usually be supplied to the operator by the means provided in the building. The amount of current resulting from an electric force, after passing through all resistances (measured in ohms) which it has had to encounter, and in all of which it has developed heat, is expressed in amperes, obtained by dividing the volts of electric force by the ohms of resistance, the result of the calculation being the current in amperes; and the lanternist's arc lamp will require from 8 to 15 amperes of current to produce the desired effect. Should the current available be much in excess of that amount, it will be desirable to introduce a resistance to prevent injury to the apparatus; this may be conveniently obtained by introducing into the circuit a few feet of iron or platinoid wire of sufficient thickness to receive the excess current without being unduly heated. Of the latter wire 4 lbs. of No. 14 gauge will offer a resistance of 7 ohms with perfect safety, and the necessary length of any other wire which it may be found convenient to use can readily be ascertained from the dealer in electrical materials who supplies it. The copper wires leading the current from the main to the lantern should also be of about No. 14 gauge, and if the lanternist will introduce into his circuit a short length of tin wire, which will be fused by any excessive degree of current while remaining intact so long as it does not exceed the required amount, he will be able to guard effectually against any mishap arising from an undue supply of the electrical force, the intensity of which may be measured if desired by the aid of a voltmeter, a piece of apparatus with which the lanternist may find it convenient to be provided, and which somewhat resembles the gauge used to indicate the pressure of compressed gas in a cylinder or of steam in an engine boiler.

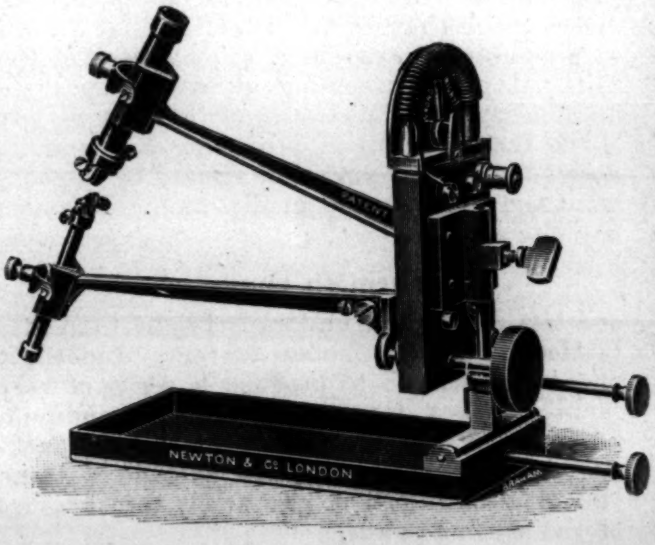


The arc lamp to be employed can be had either mounted upon a separate stand or with the usual attachment to enable it to slide on the pillar of the ordinary tray at the back of the lantern, and to be clamped by a screw at any height required in the same way as the oxyhydrogen jet. It will consist of a frame carrying two carbon holders insulated from one another, the upper to contain the positive carbon rod or pencil and the lower the negative. These, when the wires carrying the current are connected with their respective terminals, form the two electric poles, and the luminous arc will extend between them when established. The holders are caused to slide up and down in the tubes which contain them, so that the pencils of prepared carbon can be caused to meet point to point or be separated to the required distance to allow the discharge to pass between them. The necessary connections having been made, the carbon points are to be brought together for a moment in order to start the current, and immediately separated for a short distance, when the luminous discharge will pass between them and continue to do so as long as the distance remains unchanged, both carbon points becoming intensely heated and partially vaporised, while a stream of carbon vapour and minute particles passes between them so long as the discharge continues. Meanwhile, both carbons are being worn away or consumed, but not equally, the positive point being reduced twice as fast as the negative, and as this change takes place the points must approach each other at corresponding speeds so as to keep them at a uniform distance from one another, usually about one-eighth to three-sixteenths of an inch, according to the current employed. If they approach too closely a hissing or sputtering sound will be produced, and the light will be unsteady and the consumption of the carbons too rapid, while if they are too widely separated, the light will be greatly reduced and the arc will show a large orange-coloured flame, further separation causing it to go out altogether, when the carbons must again meet before the current can be restored. In the lamps used for street lighting these adjustments are made automatically by the aid of mechanism actuated by the

magnetising properties

of the electric current, but these add greatly to the cost of the lamp as well as to its size and weight, and are wholly unnecessary and indeed undesirable for lantern use, the lamps for which are constructed to be regulated by hand, a handle being provided by the aid of which the operator can readily make the required adjustments by a slight movement of his hand.

Both carbon points have now reached a very high temperature and become brilliantly incandescent, but it will be found that the positive point is more highly heated and far more brilliantly luminous than the negative, while the arc of vapour and detached particles between them, though also luminous, gives a comparatively feeble light, which is moreover of a deep purple colour. There are thus three sources of light, the brilliant positive point, the less brilliant negative one, and the still less brilliant arc, and for ordinary lighting purposes all three may take part, each contributing its share to the general effect. But for reasons already mentioned, it is desirable that the light which is to pass through the lenses and to illuminate the disc, should proceed from one point only, and the positive carbon point is obviously the one to be selected as giving far more light than either of the others. If the points are vertically above one another, the upper throws the greater number of its rays downwards, and the lower upwards, and in neither of these directions can they reach the condensers at all, while the shadow thrown by each carbon causes a further considerable loss of the light given off by the other. This is avoided in the lamps supplied for lantern use by tilting the carbon points at an angle, so that the extremity and not the side of the positive rod is directed towards the condensers, and by placing the negative or lower carbon a little forward, so that the luminous point on the upper one is formed near its front edge and facing the condensers. By this means the shadow is avoided and the most brilliant parts of the luminous rays are projected in the desired direction. The positive carbon becomes hollowed out at the point of discharge into a small cup-like cavity or crater, from the rounded surface of which the brightest rays proceed, and it is found desirable to employ for the upper pole a carbon rod of greater thickness than the lower one, and having a core or central cylinder of softer carbon enclosed in a harder outside casing or tube, somewhat as the lead is enclosed in the wooden rod in an ordinary cedar pencil. The luminous crater is formed in the extremity of this softer portion and thus its precise position can be arranged for and ensured, and the points placed at the proper angle to utilise the greatest possible number of the luminous rays. There are several very excellent forms of lamp in the market, differing slightly in details of construction and in the methods adopted to produce the result described, but all constructed with the same purpose and practically attaining it in nearly the same way. These various forms are supplied by Messrs. Newton & Co., Messrs. Ross, Limited, and other well known instrument makers, at a cost of from three to five or six



guineas, according to their construction and the amount of electric current to be used with them; the carbon rods, which last for several hours, costing about fourpence per pair, so that when once the apparatus is fitted and the electric current available, the cost of working is small, and the convenience very great, the necessary connections being readily and quickly made, and as readily detached when done with.

The lamps described are all intended for use with a continuous current of electricity, that is one which flows constantly in the same direction. Such a current gives a very steady white light when the arrangements are in proper working order, and is obviously the one best suited for optical purposes, where steady and uniform lighting is required. But in many places an alternating current is supplied, that is one which changes its direction many times in a minute or even in a second, each of the terminal poles becoming alternately positive and negative. This form of current is less silent than the other, producing a humming noise due to the vibration caused by the constant and rapid change in direction. It is also liable to give a light of a **purplish shade,** and less steady and uniformly bright than that yielded by the continuous current. Indeed, it may be considered to produce a series of very rapid changes from maximum to minimum illumination with momentary intervals of darkness between them, and the average of these changing conditions is practically the measure of the lighting power.

With a current of this kind the two carbon points share equally in producing the light, since each becomes the positive pole in its turn, and they are equally consumed. They should therefore be precisely similar rods, both having the softer core, and should be placed upright, and not in a slanting position, and be brought towards each other at the same speed, so as to keep the light properly centred in the line of focus of the condensers. Craters will be formed at the ends of both, though not very perfectly in either.

We have already seen that the upright position of the carbons must cause loss of light, so many of the rays being thrown upwards and downwards and failing to reach the condensers. Mr. T. C. Hepworth has succeeded in obviating this, at least in part, by the use of carbon rods having the core placed not in the centre of their diameter but near one side of it, and if that side be placed so as to face the condensers, the craters will be formed near the outer edge of the carbon poles, instead of being central, and the rays will be directed forward rather than upward or downward, and most of them will thus be brought within reach of the condensers and caused to take part in the illumination of the disc.

The electric light is more conveniently used in a single lantern than in one of the bi-unial or triple form, since the provision of two arc lamps and their proper connection and manipulation would materially increase the cost, and would probably require more attention than a single operator could conveniently give. The heat developed is also very great, though heated gases, the products of combustion, are not given off into the air in any considerable quantity. Dissolving arrangements depending on gradually raising and lowering the illumination are obviously not readily applicable to the electric arc, and if such effects were needed, some system of alternately obscuring the lights without altering their brilliancy, such as was used with the old oil-lighted lanterns, would probably have to be adopted. But where a single lantern will suffice for the purpose in view, and the current is at hand, the electrically lighted disc is likely to be increasingly employed, and may be found to possess many advantages.

How a Lantern Entertainment was received in Halifax, N.S.

ONE of our Halifax readers, who enjoys a good lantern entertainment whenever he has the opportunity, relates a rather funny experience. It appears that some time ago elaborate show bills were placarded on numerous shop windows in Halifax, N.S. We have obtained one of these bills, and give the wording on same, although we must omit all the grand display type for want of space. The bill reads as follows:—

"Grand magic lantern entertainment at Mayflower Hall, Cornwallis Street. Popular magic lantern concert. Crowds have seen it; crowds want to. Now's your chance to see the cheapest and best show of its kind. Programme:—Part 1 (interesting and instructing) —Jones' and Brown's pleasure trip to mighty London — New York — Bonnie Scotland —

Beautiful Europe—Ancient Egypt—Darkest Africa — Zululand — Picturesque India and Oriental China—The modern wonder of the world (the construction of the Forth Bridge). Mr. Griffiths will sing 'The ship I love.' Part 2 (fun and frolic)—De grate fite for de chambionship (causes endless laughter and amusement) – A well-deserved thrashing—Irish stew—Clever Injun—A stolen kiss—Grandpa's wig—Rats for dinner—Riding a pig to market —Down comes the dinner, the waiter and all. Mr. Griffiths will sing the comic song, 'Down the road.' Part 3 (adventure)—A great London fire—Life in the Wild West—Shipwreck—The rescue—Awful Johnstown flood—Prairie in flames—Sealing in the North. Mr. Griffiths will sing his great success, 'Shall we ever be able to fly?' Good-night. An evening of fun, amusement, and pleasure. Come one, come all. Admission—Adults, 15 c.; children, 10 c. Doors open 7.30 p.m. Commence at 8 p.m."

Such a bill, it is reasonable to think, would draw the crowds alluded to. However, our correspondent says:—"I went to the Mayflower Hall at about 8 p.m. When I got there I found the boss of the show standing at the door waiting for the crowd that never came. What struck me as being very funny was that I was the only fool (?) that turned up. He had to close up the show. . . Another lantern for sale."

It might be interesting to know if any of our readers have heard of a parallel to this in Great Britain.

◆

Interesting Items.

By THOMAS BYFORD.

A Cheap Opaque Screen.

PURCHASE 8 yards of sheeting 72 inches wide at say 1s. 0½d. per yard. If this is cut in two and machined down the centre it will make a 12 feet screen. To render it opaque, procure 4 lbs. of white lead, mix it with equal parts of turpentine and varnish, with a little ivory black ground in turpentine added, just enough to rid it of the yellowy look, strain it through some fine muslin before using.

Fasten the sheet to a wall by means of small clout nails, four will suffice, one at each corner. Coat the sheet twice with this paint, and add more turpentine to the second coat of paint, this will give it a dead flat looking appearance. When dry, reverse the sheet and coat the other side in the same way. The paint must be used very thinly.

Busking Extraordinary.

The writer was in a town in the North of England one Saturday evening during the early part of the past year, when his attention was directed to a large crowd of several hundred persons down a street leading out of the market place. On proceeding to ascertain the cause, he was surprised to see a lantern exhibition in progress on rather a unique plan.

A waggon was drawn up close to the kerbstone, the back part facing the crowd; it was covered square fashion with a tarpaulin. A white sheet was fixed at the back, and humorous slides were being thrown on it in quick succession. The exhibitor was in the waggon hidden from view. During the progress of the exhibition, which lasted about twenty minutes, collections were made by two men, and judging by the repeated chink, chink of the coppers as they fell into the boxes, the receipts must have been large.

At the close, the light from the lantern was shut off and the waggon moved on to another point and the exhibition repeated.

Chapel Entertainments.

If one has a desire to work chapels, the slides must be chosen to suit the particular bodies.

The Rev. Charles Haddon Spurgeon was a very prominent Baptist, and his "John Ploughman's Talk or Pictures," in addition to his life, would suffice for a very interesting exhibition in Baptist chapels. If the minister or some well-known local Baptist could be prevailed upon to read the lectures, so much the better for the success of the exhibition.

The "Baptist Handbook," which is issued annually from the offices of the *Christian Globe*, gives a list of the Baptist chapels in the United Kingdom. Therefore, this would act as a guide to anyone unacquainted with their location.

If the chapel is in debt a portion of the receipts could be given to the fund. A charge of 6d. each person and an audience of 250 would mean £6 5s. Deduct 50 per cent. for chapel fund, and 12s. 6d. (a large sum) for expenses, leaves £2 10s. profit; not a bad return if continued nightly. If the chapel is not in debt, a collection could be made to defray expenses.

Wesleyan and Primitive Methodist chapels could also be worked in the same way. There is no handbook issued by the Wesleyan body; consequently the county directories would have to be consulted for information regarding the location of the chapels. The "Life of John Wesley" would be a splendid appeal to those who worship at this great man's shrine.

The Congregationalists issue a yearly handbook, but there are no slides issued bearing on this body; so all that can be suggested is to select some special religious sets.

HINTS.

When a black japanned lantern body is getting dingy renovate it thus:—Procure from a store two pennyworth of Berlin black and one gill of hard oak varnish. Coat the body with the black, and when dry varnish it. Lantern cases can also be treated in the same way.

A whitewashed wall is always better than a screen. When one is met with in a schoolroom or elsewhere it should be used and the screen discarded.

An elaborate looking lantern body looks well and goes well with a certain class audience. They think it must be a good instrument if the exterior looks fetching, therefore, for this reason, a lantern with a good outside body is recommended. Outside appearances are deceiving sometimes, even in lanterns.

Screen stands are cumbersome and useless to some lanternists. In a room where a large audience is present, only the upper part of picture can be seen by those at the back when the stand is in evidence. It is much the better plan to fix the screen to the wall about 3 feet from the ground; then everyone can see without standing on the seats, and the repeated cries of "Sit down in front" is dispensed with.

High Church parsons will not allow entertainments in their schoolrooms during Lent; Low Church parsons are not so particular.

Little children should always be placed in front at a lantern exhibition. It is reasonable to suppose that they cannot see at the back; another thing, it keeps them from being annoyed by the bigger children.

CAKES AND THE RÖNTGEN RAYS.—A lady (so the story goes) during the operation of making some cakes had the misfortune to lose a valuable ring from her finger, but did not discover the loss until the cakes were in the oven. As soon as they were baked she took them to a local scientist, who, by means of the Röntgen rays, localised the gem. Value of cakes (say) 3s.; fee to scientist, £2 2s.; Irish profit, £1 19s.

Silhouette or Shadowgram
No. 22.
Slides
by
Theodore Brown.
The Dog Acrobat.

Dogs have, for very many years past, been taught to perform various little tricks. They are more easily trained, perhaps, than any other animal, and dogs who can beg, shake hands, turn somersaults, etc., are well known to all of us. We remember, too, the dog Toby, who, with Punch and Judy, helps to amuse the younger generation as it helped to amuse the generation before.

The present mechanical slide represents a dog rolling a ball along in obedience to the commands of the inevitable clown, who brandishes a stick, presumably to inspire the dog with "a wholesome dread." This slide, like its predecessors, will be found comparatively easy of construction and natural in its effects.

Two glasses are employed fitted into the ordinary framework, one fixed and the other movable. We will consider the fitting up of the sliding glass first.

A sectional view of this sliding glass is shown in Fig. V., and a front view in Fig. VI., A. At its two extreme ends are glued two small wooden blocks, and through these blocks is passed a thin thread as shown. This thread is secured by means of knots, but it should be left sufficiently slack so that it may pass once round a grooved wheel which will be referred to in detail presently.

On the interior surface of this glass are painted various figures who are supposed to be watching the dog's performance. A few lines are also painted to represent the ground, and at the extreme end of the glass the clown is sketched, rather larger than the other figures so as to appear more prominent, and in proportion to the size of the dog. Nothing more needs to be done to this glass, so we will pass on to the more important one, the fixed glass, a sectional drawing of which is shown in Fig. V.

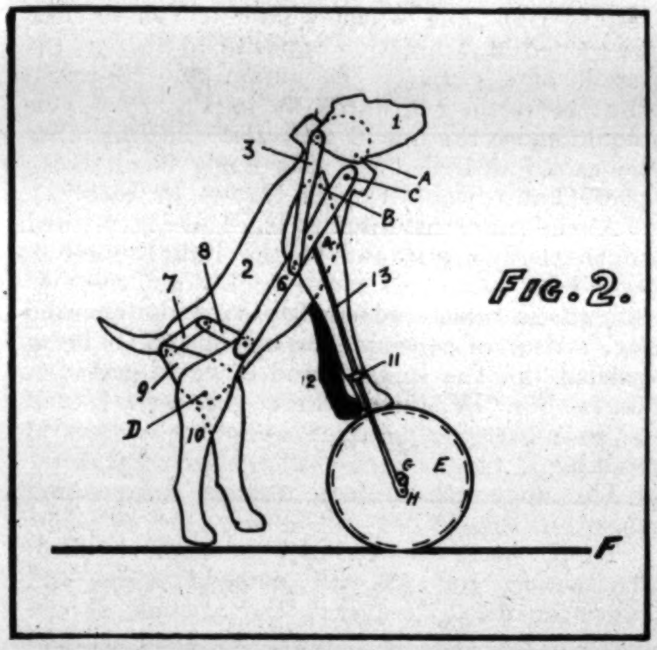


FIG. 2.

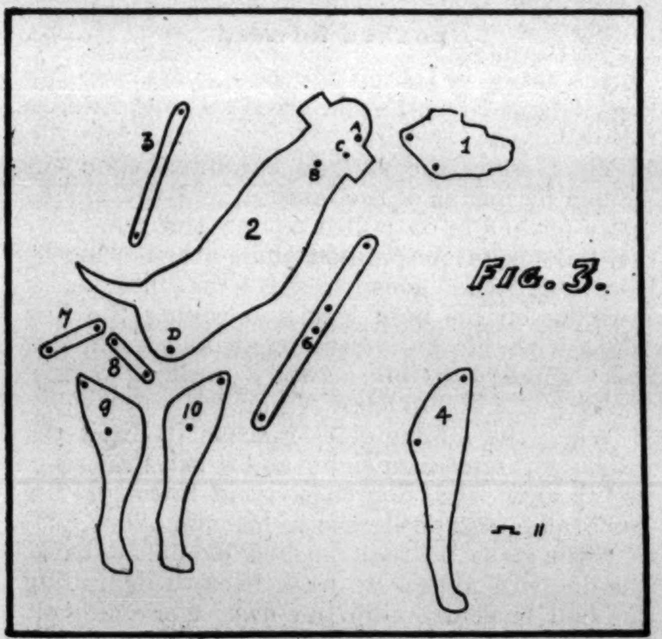


FIG. 3.

A support block, shown in Fig. V., is glued to this fixed glass and into this block is fastened a screw (Fig. V. and Figs. II. and IV., G), which serves as a pivot to the grooved wheel which represents the ball rolled along by the dog. The head of this screw is let into the wheel as shown, so that it may not come into contact with the action rod and interfere with its movement.

Between this wheel and the support block should be placed a small washer in order that the wheel may have perfect freedom to turn on the screw.

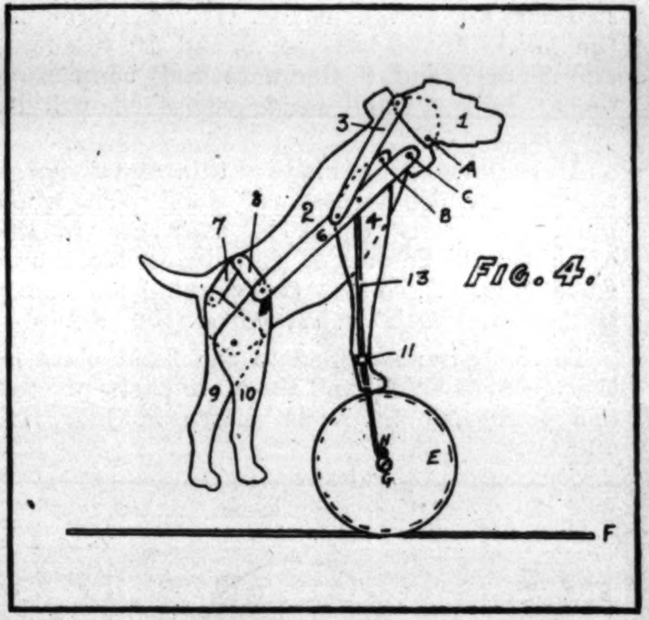


FIG. 4.

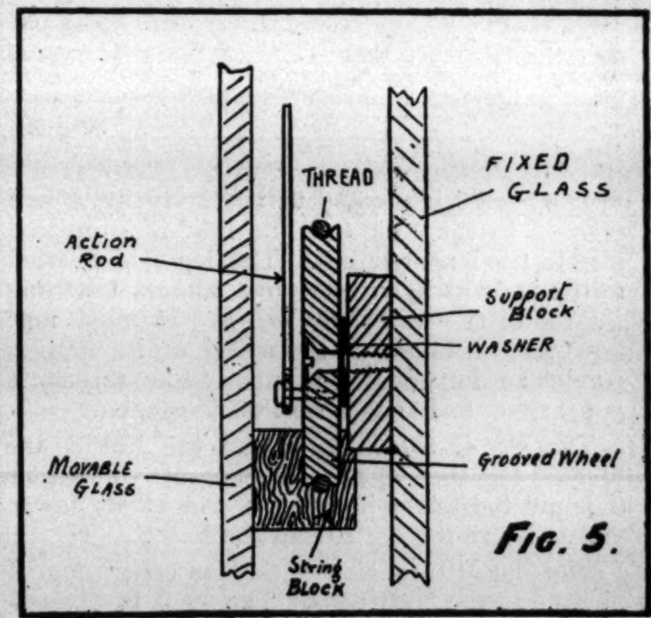


FIG. 5.

The wheel is actuated by the thread before-mentioned, which passes once round it, and when the thread is moved, therefore, the wheel is turned. This principle has been used before in the slides entitled "Street Arabs at Play," and "The Tumblers," so our readers will doubtless be familiar with it. It is especially important here, as it not only causes the revolution of the wheel or ball, but also, through the revolution of the wheel, the movements of the dog.

Perhaps it would be as well if at this point the fitting up of the dog be described.

The component parts necessary for its construction are shown in Fig. III. 1 represents the head, 2 the body, 4, 9 and 10 the legs, and 3, 6, 7 and 8 the necessary connecting links. 11 is a small staple whose use will be seen later.

All these parts are made of thin metal except the body, which is made of wood. The wood must be nearly equal in thickness to the combined thicknesses of the support block and wheel (Fig. V.), so that the working parts may be on a level with the action rod (Fig. V.).

The body is now glued to the fixed glass in the proper position, and the other parts pivoted and connected to it as shown in Figs. II. and IV.

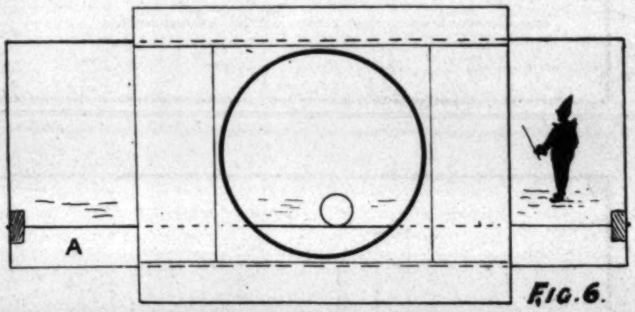


FIG. 6.

The head 1 is pivoted to the body at A, and pivoted to the link 3. The link 3 is pivoted also to the longer link 6. The leg 4 is pivoted to the body at B, with the foot almost touching the top of the wheel or ball E. It must not, however, quite touch the wheel or its motion would be impeded, but upon the screen it appears to, and that is all that is needed.

The leg 4, the link 6, and the link 3 are pivoted together at the same point. The link 6 is pivoted to the body at C, and at its lower extremity to the leg 10 and the link 8.

The leg 10 is also with the other leg 9 pivoted to the body at D. The leg 9 is pivoted to the link 7, which is in turn pivoted at its other extremity to the link 8.

There now remains to be described the action rod 13 (Figs. II. and V.). This is pivoted to the wheel at H, and passing through the staple 11, which is soldered to the leg 4, is pivoted at its other extremity to the link 6.

The sham leg 12 (Figs. II. and IV.) should now be painted upon the fixed glass in black, when the slide will be completed and ready for exhibition. I will describe its action as the sliding glass is pushed in and out. Particular reference will be made to the Figs. II. and IV.

When the string F in Fig. II. is pulled from left to right, the wheel would in consequence be turned in a direction opposite to that of the hands of a clock. The action rod 13 would thus be pushed upwards as in Fig. IV. This would cause the link 6, and also the link 3, to be raised a little, and the dog's head, being pivoted at A, would thus be thrown forward.

At the same instant, the leg 4, being pivoted to the body at B and to the links 3 and 6, would be caused to move back from right to left till it registered exactly over the painted leg. Also, in consequence of the link 6 being pushed up, the links 7 and 8 would contract as in Fig. IV., and cause the legs 9 and 10 to cross one another as in the action of walking.

The dog will, in fact, assume the position shown in Fig. IV.

Then, when the string F is further pulled, the action rod 13 will descend again and cause the dog to reassume the attitude shown in Fig. II. That is to say, the head will be thrown up, the leg 4 will be **pushed forward** in the action of rolling the ball along, and the legs 9 and 10 will again cross as in the action of walking.

Thus, when the slide is exhibited upon the screen by means of the lantern, and the sliding glass pushed in or pulled out as the case may be, the spectators painted thereon will pass by the dog, who goes through the motions of walking on his hind legs and rolling the ball along with his two front legs; and so the dog will appear to be actually walking along, pushing the ball in front of him.

When the sliding glass reaches its limit the clown will appear in sight, and it will thus seem as though the dog has gone through his performance in obedience to his commands.

If the glass be then pushed or pulled back, the dog will appear to walk backwards, rolling the ball back with him, an even more difficult trick than the former.

In conclusion, it should be mentioned that owing to its horizontal nature the movement of the string is not visible upon the screen, and the string is itself rendered to a large extent unnoticeable by the lines drawn on the sliding glass representing the ground.

The Optics of Trichromatic Photography.—Part III.

THE TRAILL TAYLOR MEMORIAL LECTURE.

Continued from page 10.

Du Hauron displayed extraordinary ingenuity, but, like Collen, he was missed by Brewster's theory of colour, and there were fatal defects in every method which he proposed.

One of his mistakes was in the assumption that pure colour screens should be used in the photographic analysis intended for positive synthesis, and that the same screens should be used again in the synthesis. Another was that negatives of a totally different character would be required for the purpose of negative synthesis by superposed transparent colour prints.* He recognised that the opacities of each of the three negatives intended for *positive* synthesis should represent a single colour element only, but not that they should be made through "colour curve" screens for synthesis with "pure colour" screens. With respect to the character of negatives required for colour print synthesis, he made exactly the same theoretic mistake as Collen. He assumed that the opacities in each negative employed to make colour prints should represent two of the colour elements instead of one only; but, instead of superposing two single element negatives, he proposed to allow two colour elements to act together in producing each negative.† For instance, he would allow both the blue and the yellow to act in the production of the negative for making red prints. The *principle* is exactly the same as that enunciated by Collen, and has the same fatal defect. Du Hauron himself saw that two colour elements could not be fully represented in a single negative in their relation to the whites and greys, but declared that in practice the defect was not as great as would naturally be expected, and made an ingenious but wholly inadequate argument to explain away the difficulty.

No amount of argument can nullify a fact.

It has been asserted that Du Hauron's "binary" spectrum colours in reality correspond to the true "primaries," the descriptive term and not the colours themselves being erroneous. Writers who have made this assertion imply that I have misunderstood and misrepresented Du Hauron's work, but they are mistaken. Du Hauron not only plainly specified the "sifting of the rays of the two other colours," in contradistinction to exclusive sifting of the simple colours, but he distinctly said that *yellow and blue objects* must act alike (and as white) through the "green" screen, and while admitting that a cobalt blue glass is better than a "violet" * one for the blue-red negative, he adds that "there is here presented a physical fact not in accord with the theory."

This error of Collen and Du Hauron dies very hard, and is perpetuated with supreme assurance by new writers every little while.

One fact which must not be ignored is that, although Du Hauron's theory was that the printing colours should correspond to his idea of the primary spectrum colours, red, yellow, and blue, the colours which he actually recommended are not *very* far removed from the *minus* colours of the true "primaries." His blue (Prussian blue) is a greenish blue; his red (carmine) is a crimson red; and his yellow is a *minus* blue. The fact is, that sheer experience led him to depart very considerably in the right direction from the requirements fixed by his theories; but his conclusion, most positively stated, that the photographs for positive synthesis should be made by "exclusive passage of the single colour corresponding," while the photographs for negative synthesis should be made by "rays of the two other colours," is proof positive that he utterly failed to grasp the true relation between the two kinds of synthesis—the *plus and minus* character of the synthesis colours themselves—which certainly demands *identical* colour records for both purposes, and also that they shall be "single element," "colour curve" records.

Du Hauron's most important new contribution to the development of trichromatic photography at this period was his suggestion of a photochromoscopic device, of which I shall speak in another part of my lecture.

This may seem scant treatment of Du Hauron's early exploitation of the principles of trichromatic photography, in view of the fact that many people have regarded his early writings as the fountain head of this science; but I must take the facts as I find them, and his more or less natural errors do not in any way detract from my admiration of his prophetic spirit, and ingenuity, and fertility of imagination, which should be an inspiration to everybody who can read his original treatise on trichromatic photography.

Du Hauron's first patent application was dated November 23, 1868, but his first printed publication appeared in *le Gers*, March 11, 13, 16, 18, 20, 23, and April 1 and 6, 1869, and shortly afterwards in pamphlet form. According to his brother, Alcide Ducos Du Hauron, he had communicated his ideas very fully, except in the matter of negative synthesis, in a mémoire transmitted to a French scientist and Member of the Institute, M. Lélut, July 14, 1862. It is a curious fact that this mémoire, said to have been intended for formal presentation to the Institute, but which was not published until 1897,† discloses several important ideas which are not to be found in any of Louis Ducos Du Hauron's writings which were published prior to 1897, and which had meanwhile been published or patented by others. I shall have occasion to refer to this mémoire again.

After Du Hauron applied for his patent, but before there had been any publication of his method, Chas. Cros, of Paris, proposed a system of trichromatic photography in a communication which appeared in *Les Mondes*, February 25, 1868, and it is stated that he had described the same system two years before in a sealed mémoire deposited in the Academy of Sciences.

(*To be continued.*)

---

* "When the reader has read this book entirely through, he will recognise that, in the method described in Chapter IV., and which constitutes the direct method [for positive synthesis] . . each of these images is obtained by the exclusive passage, or sifting of the rays of the simple colour corresponding, through a space of the same colour. Proceedings are not the same for the method of inversion" [for colour print synthesis].—*From Louis Ducos Du Hauron's treatise of* 1869.

† "Each of the images, instead of being obtained by a sifting of the rays of the corresponding simple colour through a space of that colour, is obtained by a sifting of the rays of the two other colours through a space of the double colour complementary to its own."—*Du Hauron in* 1869.

* He describes "violet" as a colour containing a large proportion of red, showing that he means purple, which is called for by his theory.

† "La Triplice Photographique des Couleurs et l'Imprimerie." Alcide Ducos Du Hauron, Paris, 1897, p. 450.

PATENT INTELLIGENCE.

The following List, relating to current Patent Applications, is compiled expressly for the "Optical Magic Lantern Journal" by W. P. Thompson & Co., Patent Agents, of 322, High Holborn, London, W.C., to whom all enquiries for further information should be addressed.

No.	Recent Patent Applications.
20789.	17th November, 1900. Christian Heinrich Emil Adolf Miethe. An improved process for projecting multi-colour photographs and apparatus therefor.
20818.	17th November, 1900. Walter Gibbons. Improvements in apparatus for producing animated effects.
20828.	19th November, 1900. Benjamin Wilkinson. Improvements in or relating to tripods for photographic cameras.
20860.	19th November, 1900. Herbert Holmes and George Houghton. An improved focusing device for photographic cameras.
20861.	19th November, 1900. Percy Fortunatus Coggin. An improved photographic retouching desk.
20862.	19th November, 1900. Frederick Herbert Sanderson. Improvements in photographic cameras.
20863.	19th November, 1900. George Houghton and William Albert Edwards. An improvement adapted for photographic view finders.
20868.	19th November, 1900. Jean Schmidt. Improvements in electric lamps for use in photography.
20932.	20th November, 1900. Paul Rudolph and Oswald Nather. Improvements in roll-holding cameras. (Complete.)

Copies of the following specifications may be obtained by remitting 1/- for each specification to W. P. Thompson & Co., Patent Agents, 322, High Holborn, London, W.C.

Specifications Published.

17165 of 1899. Thornton and Rothwell. Transparent photographic films and the manufacture thereof.
25404 of 1899. Clarke. Photograph developing tray rocker.
311 of 1900. Kamm. Apparatus for photographing and exhibiting cinematographic pictures.
5583 of 1900. Laux and Kranz. Dark-blacks and holders therefor for taking successively several photographs on the same plate.
6093 of 1900. Hall. Lamps for use in photography.
16282 of 1900. Shipway. Apparatus for supporting photographic cameras when in use for taking photographs.
16996 of 1900. Ross, Limited (Warner and Swasey). Means for adjusting and fixing the prisms in prismatic field and opera glasses and telescopes.
17044 of 1900. Augstein. Cameras.
17429 of 1900. Hall. Camera supports.
18535 of 1900. Goerz. Device for changing photographic plates or films in daylight.
23992 of 1899. N tley and Frost. Lamps for burning hydrocarbon, oil, or spirit.

Notes and Queries.

T. R. (Oldham).—The only trouble from your description appears to be that you have not placed the illuminant at the correct distance from the condenser. Try this, and if not effectual write again.

Scotia.—There is no duty on the goods coming to England. We thank you for your interesting letter, part of which we allude to elsewhere.

W. C. Furnas.—Delighted to have your newsy letter, and shall at all times be very glad to hear from you.

Summer C. Wood.—The first jet to which you allude is practically a blow-through jet in the ordinary sense, although the oxygen nipple is set back somewhat, and surmounted by a cone-shaped orifice. The second jet is on a totally different principle, and the difference in light obtainable is very great.

W. B.—(1) Stretch the screen and give it a couple of coats of whitewash containing a little blue, or you can prepare it as instructed in this Journal for March, 1900, page 31. The present issue (page 19) also contains instructions. (2) Theoretically there might be a slight difference, but practically there is none if the lens is of any account; all the rays should go through the 2 inches.

Gilbert Wood.—The event will be over by the time this issue reaches the public.

Major Barrett.—You will not be able to obtain a sufficient light under the conditions you name from acetylene. An ordinary commercial lantern combination and ordinary slides will answer well with acetylene, and you can count, roughly speaking, on getting a little better light than with the best oil lamp.

F. H. Rowntree.—Lantern plates are not made to give the effects you enquire about. To make the paper for blue prints, take:—(1) Citrate of iron and ammonia, 2 ounces, water 8 ounces; (2) ferridcyanide of potassium, 1¼ ounces, water 8 ounces. Mix 1 and 2 in equal proportions just before using, and float ordinary stout paper on this for 3 or 4 minutes, and hang in the dark until dry. Expose under negative in the sun, and develop with water.

Photophil writes:—I have failed in demonstration experiments to separate out the blue or violet rays (either will do) of the spectrum on a screen. A sample of thick dark-blue glass I have found best, but this lets a good deal of green pass. Ammonio-sulphate of copper seems generally mentioned for this purpose, but I have not succeeded in preparing a solution which acts satisfactorily. Can you give me a recipe for its preparation? *Ans.*—The ordinary dark-blue glass of commerce (cobalt glass) lets through very much of the green, but if you back this glass by a piece of light manganese glass (amethyst colour), you will cut out the green. The manganese glass allows the two ends of the spectrum to pass, chiefly red and blue-violet. The cobalt glass cuts out the red. The combination, if the densities of the two glasses are rightly apportioned, is far more violet than ammonio-sulphate of copper. To make the ammonio-sulphate solution, dissolve a quarter of an ounce of sulphate of copper in a pint of water, then add sufficient liquid ammonia to redissolve the precipitate which is first formed. A strong (saturated) solution of sulphate of copper may be used in a flat sided glass cell, provided that you employ a rather weak solution of nitrate of cobalt to cut out the green.